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Spring 2-1-2017

### CSCI 491.02: Deep Learning

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# CSCI 491-02 / 595-02

## Deep Learning

### Spring 2017

Instructor: Dr. David Opitz  
Office: Social Science 404  
Office Hours: TR 1-2 (And by appointment)  
Email: dave.opitz@mso.umt.edu

#### Class times and location:

Time TR 2:00PM-3:20PM. Location: SS 362

#### Course Prerequisites:

Calculus II. Probability & Statistics. Programming fluency. Machine Learning. Consent of instructor.

#### Overview:

Machine Learning has become the hottest topic in computer science and a big reason for this is the recent advances in Deep Learning. Deep Learning is, in a nutshell, where neural networks meet Big Data.

The course is be a combination of:

- traditional lecture (mostly at the beginning),
- watching videos or reading outside of class followed by in-class discussion,
- student lectures, and
- individual project.

After successfully completing this course, students should be able to understand:

- The problem of supervised and unsupervised learning; classification and regression,
- The importance of inductive bias and other basic Machine Learning,
- Testing, training, and validation sets; accuracy assessment,
- Multi-layered perceptrons; their effectiveness and their limitations,
- Regularization for Deep Learning,
- Optimization for Training Deep Models,
- Convolutional Networks,
- Sequence Modeling: Recurrent and Recursive Nets,
- Linear Factor Models,
- Autoencoders,
- Representation Learning,
- Structured Probabilistic Models for Deep Learning,
- Open problems in deep learning,
- Current deep learning software packages,
- How to critically analyze and present a topic for research, and
- How to conduct an independent Deep Learning project.

**Attendance:**

Attendance is necessary as participation and student presentations are a central part of the course. Exceptions will be made for extraordinary situations (e.g. death of an immediate family member, medical conditions, etc.) which will be handled on a case-by-case basis.

**Grading:**

Class presentations, homework and participation (50%)  
Project (50%)

**Text Book:**

*Deep Learning*. By Ian Goodfellow, Yoshua Bengio and Aaron Courville. MIT Press. April, 2016. (Currently available online for free; [www.deeplearningbook.org](http://www.deeplearningbook.org))

Additional electronic reading material will be announced during the semester.

**Incompletes and Late Drops:**

The university empowers instructors with discretion to approve incompletes or late drops. I will not approve either as a means of avoiding a low grade or as a means of protesting course policies. Valid reasons include family emergencies, work complications, or registration issues, but I reserve the right of approval or disapproval on a case-by-case basis.

**Disabilities:**

This course is accessible to and usable by otherwise qualified students with disabilities. To request reasonable program modifications, please consult with the instructor. Disability Services for Students will assist the instructor and student in the modification process. For more information, visit the Disability Services website at <http://life.umt.edu/dss/>.

**E-Device Use During Class:**

Students are welcome to use laptops, tablets, or other e-devices to take notes, refer to materials, etc. as long as this use does not create noise or distractions. Students are not welcome to have e-devices make sound during class. Students are not welcome to answer calls verbally or otherwise generate noise in class.